

-33-

What is claimed:

1. An internet-based method for a paid service to maintain data connectivity of a remote medical device-configured patient to a database network and to enable medical device data exchange and processing, comprising the steps of:

receiving in a substantially continuous manner at a database network site first data inputs uniquely representative of sensed physiologic information from a specific medical device configuration of a patient using said medical device configuration;

enabling the database network site to communicate with at least one web-enabled web-site and to receive web-site originated signals requesting access to representations of said first data inputs from said database; and

monitoring data packages to determine revenue for the service.

2. The service method of claim 1 further including the step of providing said web-site and configuring said web-site with a user interface which includes a sign-in input to enable access to said database network site.

3. The service method of claim 1 in which the receiving step includes receiving at least one signal carrying information representing sensed physiologic status within the patient from at least one medical device located on or at least partially in the patient's body.

4. The service method of claim 1 in which the receiving step includes receiving signals carrying information representing actual physiologic phenomenon within the patient as sensed by at least one medical device located on or at least partially in the patient's body.

5. The service method of claim 1 in which the receiving step includes receiving signals carrying information representing actual physiologic phenomenon within the patient as sensed by a plurality of medical devices located on or at least partially in the patient's body.

-34-

6. The service method of claim 1 in which the enabling step comprises providing a secure sign-in and validating an originator's security-related action prior to allowing access of the originator to the database information.

5 7. The service method of claim 1 in which the first data inputs provides intermediate information to enable further production of data representations enabling subsequent actions.

10 8. An internet-based method for a paid service to maintain connection of a remote medical device configured patient to a database network and for medical device data exchange and processing comprising the steps of:

15 providing a web-site in a web-enabled system, the web-site having a user interface which includes a sign-in input to enable access to a database network site associated with said web-enabled system;

20 receiving in a substantially continuous manner at the database network site first data inputs uniquely representative of sensed physiologic information from a specific medical device configuration of a patient using said medical device configuration;

25 receiving at the web-site second data inputs requesting access to representations of said first data inputs available at said database; and

30 enabling the originator of said second data inputs to have access to the database via the secure web site to view representations of said first data inputs.

9. The service method of claim 8 in which the database network site receiving step includes receiving at least one signal carrying information representing sensed physiologic status within the patient from at least one medical device located on or at least partially in the patient's body.

10. The service method of claim 8 in which the database network site receiving step includes receiving signals carrying information representing actual physiologic phenomenon within the patient as sensed by at least one medical device located on or at least partially in the patient's body.

-35-

11. The service method of claim 8 in which the database network site receiving step includes receiving signals carrying information representing actual physiologic phenomenon within the patient as sensed by a plurality of medical devices located on or at least partially in the patient's body.

12. The service method of claim 8 in which the enabling step comprises providing a secure sign-in and validating an originator's security-related action prior to allowing access of the originator to the database information.

13. The service method of claim 8 in which the first data inputs provides intermediate information to enable further production of data representations enabling subsequent actions.

14. An internet-based method for a paid service to maintain data connectivity of a remote medical device-configured patient to a database network and to enable medical device data exchange and processing, comprising the steps of:

receiving in a substantially continuous manner at a database network site first data inputs uniquely representative of sensed physiologic information from a specific medical device configuration of a patient using said medical device configuration;

initiating processing of said first data inputs to produce user accessible signals which represent the first data inputs in a user accessible format to enable action based on observations of the user accessible signals; and

enabling the database network site to communicate with at least one web-enabled web-site and to receive web-site originated signals requesting access to representations of said first data inputs from said database.

15. The service method of claim 14 in which the step of initiating processing includes initiating analysis of the first data inputs to determine whether any sensed physiologic activity is abnormal.

-36-

16. The service method of claim 14 in which the step of initiating processing includes initiating analysis of the first data inputs to determine actual values for any sensed physiologic activity.

5 17. The service method of claim 14 in which the step of initiating processing includes initiating analysis of the first data inputs to determine whether any sensed physiologic activity is indicative of a demonstrable or likely pattern of physiological activity.

10 18. An internet-based method for a paid service to maintain data connectivity of a remote medical device-configured patient to a database network and to enable rapid medical device data exchange and processing of certain conditions, comprising the steps of:

15 receiving in a substantially continuous manner at a database network site first data inputs uniquely representative of sensed physiologic information from a specific medical device configuration of a patient using said medical device configuration; and

enabling the database network site to communicate with at least one web-enabled web-site to automatically deliver representations of said first data inputs from said database when certain conditions are met.

20 19. The service method of claim 18 in which the step of enabling includes initiating automatic software analysis of the first data inputs to determine whether any sensed physiologic activity is abnormal.

25 20. The service method of claim 18 in which the step of enabling includes initiating automatic software analysis of the first data inputs to determine actual values for any sensed physiologic activity.

30 21. The service method of claim 18 in which the step of enabling includes initiating automatic software analysis of the first data inputs to determine whether any sensed physiologic activity is indicative of a demonstrable or likely pattern of physiological activity.

-37-

22. A computer readable data transmission used in an internet-based method for a paid service to maintain data connectivity of a remote medical device-configured patient to a database network and to enable rapid medical device data exchange and processing, containing a data structure comprising:

a first portion identifying a medical device configuration;  
a second portion identifying a patient using said medical device configuration;  
a third portion containing data uniquely representative of sensed physiologic information from the medical device configuration of the identified patient using said medical device configuration; and

a fourth portion containing communications protocol data to enable rapid electronic transfer of the signal to a network-based server;

whereby the data structure enables rapid automatic analysis of the data at a destination processor determined by the server and automatic formatting of the processed data into a user accessible signal to enable further action.

23. The data transmission of claim 22 in which one of said portions includes data which identifies the source of the sensed physiologic information when data is sensed by a plurality of medical device sensing elements.

24. The data transmission of claim 22 in which one of said portions contains an alert data signal enabling rapid parsing of an alert condition as determined by a comparison of sensed physiologic information with pre-determined set points.

25. A computer readable data transmission used in an internet-based method for a paid service relating to a remote medical device-configured patient connected to a database network, containing a data structure comprising:

a first portion identifying a medical device configuration and a patient using said medical device configuration;

a second portion containing high relevance data uniquely representative of sensed and processed physiologic information from the medical device configuration of the identified patient; and

-38-

a third portion containing communications protocol data to enable rapid electronic transfer of the signal to at least one network-based server and at least one web-enabled user;

whereby the data structure enables rapid automatic transfer of a user accessible signal to enable further action.

26. The data transmission of claim 25 in which the first portion is formatted to include data which identifies the source of the sensed physiologic information when data is sensed by a plurality of medical device sensing elements.

27. The data transmission of claim 25 in which the second portion is formatted to include at least one of the presentation formats including data, graphs, charts, virtual real time data plots, tables, historical data, waveforms, video, audio, uniform resource locators, link activators to additional information, tool bars for enabling analysis of the data, visible or non-visible algorithms, or other formats of information to be presented to a user.

28. The data transmission of claim 25 in which the second portion is formatted to include present data useful in analyzing at least one of the features including the performance of the medical device configuration, the patient physiologic status, compliance of the patient to a certain protocol, device or patient trend analysis, adequacy of the medical device configuration for the anticipated physiologic condition of the patient, suitability of the patient for referral to other entities within an overall healthcare system, suitability of the patient for referral to other entities within an overall disease management organization, suitability of the patient for referral to other web-based entities, and other uses.

29. An internet-based method for a paid service to rate the relevance and value of user selections of health related information sites in a web-based environment, comprising the steps of:

-39-

providing a web-site in a web-enabled system, the web-site having a user interface which includes a sign-in input to enable access to a database network site associated with said web-enabled system;

receiving at the database network site first data inputs uniquely representative of sensed physiologic information from a specific medical device configuration of a patient using said medical device configuration;

receiving at the web-site second data inputs requesting access to representations of said first data inputs available at said database; and

enabling the originator of said second data inputs to have access to the database via the secure web site to view representations of said first data inputs;

providing web-site options to the originator whereby the originator may seek information in the web-enabled system responsive to the viewing of representations of said first data inputs; and

using automatic software-based steps to compare and rate the relevance and value of the web sites selected by the originator in relation to the physiologic condition of the patient.

30. The service method of claim 29 further comprising the step of initiating actions depending on values for relevance and value of originator-selected site.

31. The service method of claim 30 in which the actions include at least one of the steps of advising the originator of the values, advising a third party of the values, recommending alternate sites for viewing to the originator, assigning a revisable rating category to the originator, transferring the values to a database for further analyses, computing an aggregate value of the values of certain categories of a plurality of originators, utilizing the values to allocate fee alterations or other payment changes for patients or other originators based on values observed.

32. A computer implemented method for improved data management in the healthcare industry by increasing patient engagement with recommended healthcare delivery modalities, comprising the steps of:

-40-

a. providing an implanted medical device configured for automatic sensing of high relevance biologic data of the patient and transmitting that data, or portions thereof, to an information parser of the healthcare professional;

b. configuring a patient accessible electronic interface to receive signals representative of sensed high relevance biological data of the patient;

c. providing selectively programmable computer implemented rapid interpretations of the sensed high relevance biologic data and, when indicated, electronically sharing with the healthcare professional the details of the sensed high relevance biological data without resort to personal contact or face to face meeting between the healthcare professional and the patient; and

d. providing information flow paths for the healthcare professional to further contribute to the knowledge database and patient engagement by offering the patient and a patient's designated advocate direct information about the high relevance biologic data thereby actively engaging the patient in a highly content rich yet efficient manner.

33. A computer implemented internet-based method for an improved connect and monitoring service to rapidly connect remote persons to a database network for medical device data exchange and analysis, said method being characterized in that it comprises the steps of:

providing a web-site having a user interface wherein the user interface includes a secure sign-in input to access a database network site;

receiving at the web-site automatic inputs associated with a specific medical device and user of the device;

automatically confirming the identity of the medical device and the user; and

enabling the user to access the database via the web-site to use the service for real time monitoring of high relevance physiologic data mined from all monitored data of the user.

34. The method of claim 33 wherein said web-site further includes a proxy right access scheme to provide privileged access to a user's data by friends or family as programmed.



-41-

35. A computer implemented internet-based method for improved user compliance within a medical patient management system in which the system automatically determines which connection protocols to follow to rapidly connect one or more remote persons to a database network for medical device data exchange and analysis under certain conditions, said method being characterized in that it comprises the steps of:

providing a web-site having a user interface wherein the user interface includes a secure sign-in input protocol to access a database network site;

receiving at the web-site automatic inputs associated with a specific medical device and user of the device;

automatically confirming the identity of the medical device and the user; and

performing computer implemented analyses to determine which user groups to rapidly and selectively automatically access the database via the web-site for receipt of high relevance physiologic data mined from all monitored data of the user.

36. The computer implemented internet-based method for improved user compliance of claim 35 further comprising:

alerting a select group of medical providers to an event using an event service;

and

enabling the select group of medical providers to execute secure access to the device user's database in a single sign-on action per user in the group.

37. The method of claim 36, wherein said single sign-on action includes authentication to a foreign web-site that is passed over to access the secure device user's database.

38. The method of claim 35 further characterized by computer implemented automatic formatting of automatically processed high relevance data mined from all detected data, and electronically pushing the formatted data to an electronic display of at least one member of a group of medical providers whereby at least one of the group of medical providers selectively provides commentary and then directs a data

-42-

transmission back via the web site to the user of the medical device, to a designated advocate of the user of the medical device, and, optionally, to another member of a medical providers group.

5 39. A computer implemented patient management network configured for implementing the method of automatically determining which connection protocols to follow to rapidly connect one or more remote persons to a database network for medical device data exchange and analysis under certain conditions, said network being characterized in that it comprises:

10 a web site having a user interface wherein the user interface includes a secure sign-in input protocol to access a database network site;

sensing and signal components for providing automatic inputs to the web site associated with a specific medical device and user of the device;

15 processing routines and module for automatically confirming the identity of the medical device and the user; and

20 processing routines and module for performing computer implemented analyses to determine which user groups to rapidly and selectively automatically access the database via the web-site for receipt of high relevance physiologic data mined from all monitored data of the user.

25 40. A system for implementing a disease management service for a remote chronic patient with an implantable medical device and/or wearable device wherein the service includes multi-users of data and information exchange systems cooperating to provide the service for continuously managing the chronic patient's disease, health care and medical devices comprising:

a server hosting medical and physiological data collected from the patient;

a physician station in data communications with the server; and

30 a health care system information network being in a bi-directional communication with the physician station and further having a data communication with the server;

a disease management organization in bi-directional communications with said health care system information network; and

-43-

said server including at least one set of database of information concerning the patient wherein the database is structured to assist the disease management organization to manage the patient for a fee.

5 41. A system for implementing a disease management service for a remote chronic patient with an implantable medical device and/or wearable device wherein the service includes multi-users of data and information exchange systems cooperating to provide the service for continuously managing the chronic patient's disease, health care and medical devices comprising:

10 a server hosting medical and physiological data collected from the patient;

a physician station in data communications with the server; and

a health care system information network being in a bi-directional communication with the physician station and further having a data communication with the server;

15 a disease management organization in bi-directional communications with said health care system information network; and

said server including at least one set of database of information concerning the patient wherein the database is structured to assist the health care system information network to manage the patient for a fee.

20 42. A system for implementing a disease management service for a remote chronic patient with an implantable medical device and/or wearable device wherein the service includes multi-users of data and information exchange systems cooperating to provide the service for continuously managing the chronic patient's disease, health care and medical devices comprising:

25 a server hosting medical and physiological data collected from the patient;

a physician station in data communications with the server; and

a health care system information network being in a bi-directional communication with the physician station and further having a data communication with the server; and

30

-44-

said server including at least one set of database of information concerning the patient wherein the database is structured to assist the health care system information network to manage the patient for a fee.

5 43. A system for implementing a disease management service for a remote chronic patient with an implantable medical device and/or wearable device wherein the service includes multi-users of data and information exchange systems cooperating to provide the service for continuously managing the chronic patient's disease, health care and medical devices comprising:

10 a server hosting medical and physiological data collected from the patient;

a physician station in data communications with the server; and

a disease management organization in bi-directional communications with said server and said physician station; and

15 said server including at least one set of database of information concerning the patient wherein the database is structured to assist the disease management organization to manage the patient for a fee.

20 44. A data collection and transfer system for implementing a chronic remote patient monitoring service for transmission of very high relevance medical and physiological data from a person having at least one implanted and/or wearable medical device, the service comprising:

a server hosting high relevance medical and physiological data accessible via a remote monitor in data communications with the server;

25 at least one medical device implanted or wearably located on a person being in data communication with the remote monitor; and

the server being web-enabled to host and provide multi-directional data collections from various services including said person so that the collected data may be re-transmitted for a fee provided by one or more recipients of the data.

30 45. The service of claim 44 wherein said at least one implanted and/or wearable medical device is in wireless communication with the remote monitor to enable data communications when the person is ambulatory.

-45-

46. The service of claim 44 wherein said server includes programmable parameters to bill the person for services rendered.

5 47. A system for implementing a computerized healthcare information service network capable of collecting medical data from various remote locations including a patient with a medical device, the information service comprising:

10 a server hosting medical and physiological data collected from a patient at a remote location, said server being in data communications with a remote monitor that collects highly relevant data from the patient having at least one implanted and/or externally worn medical device;

a physician station;

a health care system information network in data communications with the server and the physician station; and

15 a billing service for the remote management of the patient's health including a service of the performance of at least one implanted and/or externally worn medical device communicating with the physician station for expert opinion and advising the patient in real time, to provide as to proper procedures to follow for therapy and medical care.

20 48. A personalized set of E-health and M-health services tailored to provide real time and uninterrupted chronic patient management for remote patients with a medical device wherein a billing scheme is automatically implemented for services rendered, the billing scheme comprising:

25 a server computer hosting the services accessible via client computers to a plurality of potential users of the service; and

said client computers being web-enabled to provide various service options to the user;

30 said service being available over the internet to assist a specific user in locating and accessing a required service relating to the patient.

-46-

49. An internet-based method for a service to connect a remote patient to a database network for medical device data exchange and review comprising the steps of:

providing a web-site having a user interface wherein the user interface includes a secure sign-in input to access the database network site;

receiving at the web-site inputs associated with a specific medical device and patient;

confirming the identity of the medical device and the patient; and

enabling the patient to access the database to use the service.

50. The method of claim 49 wherein the medical device data exchange and review further comprises at least one of the processes of:

uploading the medical device data into the database; and

accessing the medical device data in the database via a secure web site.

51. The method of claim 49 wherein said website includes a proxy right access scheme to provide privileged access to a patient's data by friends and family.

52. An internet-based method for a service to enable a nurse practitioner to access a secure web-site to respond to a notification of an event relating to a remote patient, the method comprising the steps of:

alerting the nurse to an event using an event service; and

enabling the nurse to execute secure access to the patient's database in a single sign-on action.

53. The method of claim 52, wherein said single sign-on action includes authentication to a foreign web-site that is passed over to access the secure patient database.

54. An internet-based method for a service to enable a doctor to access a rendered page about conditions of a patient, the method comprising the steps of:

alerting a physician about a patient's condition; and

-47-

allowing the physician to access the patient's database and wirelessly pull up a page so that the physician's receipt of a report summarizing the patient's condition is confirmed.

5 55. The method according to claim 54 wherein a patient management network includes the ability to push out the fully rendered page containing patient information and device information to wireless devices and is represented as a complete page replicating a presentation similar to a website page display.

10 56. The method according to claim 54 wherein said wireless pull-up includes implication of one of a Microsoft pocket PC technology and equivalent.

15 57. The method according to claim 54 wherein the physician can transcribe a voice message back to the patient and can optionally copy the message to other professionals.

58. The method according to claim 57 wherein the patient is notified about the physician's message upon the patient's home connect receiving the message.

20 59. An internet-based method for a service to connect a remote patient's friend or family member to a database network for medical device exchange and review comprising the steps of:

identifying a friend or family member authorized to access the database network; and/or

25 sending notification of a patient alert to said friend or family member.

30 60. The method according to claim 59 wherein said notification is sent via an E-mail to alert said friend or family member wherein a URL is enclosed in the E-mail to enable secure access of the patient database to the recipient after proper authentication.

-48-

61. A computer implemented business method for generating very high relevance personalized patient databases, comprising the steps of:

- a. providing a medical device to a patient in which the medical device senses very particular data concerning at least one monitored disease related symptom;
- b. enabling the medical device to sense the desired signals and re-transmit the signals electronically to a remote data analysis module; and
- c. automatically processing the sensed signals to determine whether health-related action is recommended as a consequence of the sensed signals.

62. The method of claim 61 further comprising the step of automatically alerting at least the patient and a healthcare provider that action is recommended.

63. The method of claim 61 further comprising the step of providing data to a remote healthcare professional.

64. The method of claim 63 further comprising the step of activating a voice message and email format back from the healthcare professional to the patient.

65. A closed loop information processing and communications infrastructure system for implementing a service to manage chronic disease by providing continuous information to advise and deliver therapy to remote chronic patients, the service system comprising:

- an operating room including a network system to provide surgical services, expert advice on demand, including optional teleporting, telemerging, or holographic systems, a patient to station, wherein;

- a patient with an implantable medical device including external devices that continuously track and monitor the operation of the medical devices,

- a communication interface between the remote patient station and the health care provider station, in data communication with the communication interface and the server,

- a data base and data communication with the server, and



-49-

a teleporting telemerging holographic services system in data communication with the server and in communication with the operating room, and

the server being the gateway to the database and providing a common communication system, the operating room, the expert station, the health care providers and the patient's station.

66. A network-enabled system for implementing a chronic data management and monitoring service for remote patients and medical devices comprising:

a server computer hosting high relevance data transmitted from the remote patients and medical devices;

a client computer providing access to a plurality of users of the service; and

wherein said server computer provides a user interface whereby said plurality of users are authenticated prior to accessing said data;

whereby the service is available via one of a secure Internet channels to enable an authenticated user to access data pertaining to a specific patient and/or medical device.

67. The service of claim 66 wherein said service utilizes billing and collection systems consisting of one of: computer to computer transactions, monthly statements, direct credit card transfer, micro-payment-systems and business to business collection systems.

68. An internet-based information network service for implementing medical data transfer and exchange in a health care system comprising:

means for collecting medical data from multiple remote sites; and

interface means for accessing said means for collecting by authorized agents;

wherein said interface means includes controls for authenticating a user for the service and provides selection criteria and display at any one of said multiple remote sites for the user.

69. An information system for generating medical device performance data, in real time, to enhance product performance and adapt businesses methods to provide a

-50-

continuously improving service to a chronic patient or other information users, the information system comprising:

a server hosting data transmitted from a remote patient;

a plurality of client computers providing access to the server; and

a medical device manufacturer computer being in data communications with the server wherein device data is managed to provide at least one functional group within a medical device manufacturer with highly relevant information derived from the medical device performance data for use in product or service improvement actions.

70. The system of claim 69, in which the functional sub-group is one of: research and development, product planning, post market surveillance, and sales and marketing.

71. The system of claim 69, in which the other information users include one of disease management organizations and healthcare management organizations.

72. A system for implementing networked remote patient management services comprising:

a server hosting high relevance patient management data for providing chronic monitoring of the remote patients with chronic disease having implantable medical devices and/or wearable devices; and

said server being accessible via client computers wherein said client computers include a web-enabled system, a medical device manufacturer web-site, a physician site, a health care information network site, and a disease management organization; and

each of said client computers being in data communications with the server to import specific data on which the patient management services billing schemes, for at least one service, are implemented.

-51-

73. An internet-based method in a web-enabled system for a paid service to connect a remote patient to a database network for medical device data exchange and processing comprising the steps of:

providing a web-site in a web-enabled system, the web-site having a user interface which includes a secure sign-in input to access a database network site associated with said web-enabled system;

automatically receiving at the database network site first data inputs uniquely associated with a specific medical device and patient using said medical device;

receiving at the web-site second data inputs requesting access to representations of said first data inputs;

confirming the identity of the medical device, the patient, and the originator of said second data inputs; and

enabling the originator of said second data inputs to have access to the database to view representations of said first data inputs.

74. An internet-based method in a web-enabled system for a paid service to connect a remote patient to a database network for medical device data exchange and processing comprising the steps of:

providing a web-site in a web-enabled system, the web-site having a user interface which includes a secure sign-in input to enable access to a database network site associated with said web-enabled system;

periodically receiving at the database network site first data inputs uniquely associated with a specific medical device and patient using said medical device;

receiving at the web-site second data inputs requesting access to representations of said first data inputs;

confirming the identity of the medical device, the patient, and the originator of said second data inputs; and

enabling the originator of said second data inputs to have access to the database via the secure web site to view representations of said first data inputs.